United States Patent [19]

Risley

[11] **3,812,544**

[45] **May 28, 1974**

[54] **FLUSH TANK WATER SAVER**

[76] Inventor: **James A. Risley,** 224 N. Harrison Ave., Beverly, N.J. 08010

[22] Filed: **July 23, 1973**

[21] Appl. No.: **382,687**

[52] **U.S. Cl.** ..... **4/18,** 4/1, 4/34, 4/67 A

[51] **Int. Cl.** **E03d 1/20,** E03d 1/22, E03d 1/30

[58] **Field of Search** ..... 4/1, 18, 34, 67 A, 18.5, 4/67 R, 57 R, 57 P, 52, 41, 42, , 28, 20, 29; 277/207, 211, 212

[56] **References Cited**

UNITED STATES PATENTS

1,323,703	12/1919	Linfoot	4/18
2,156,681	5/1939	Dewhirst	277/207 X
3,259,918	7/1966	Walker, Sr. et al.	4/18
3,367,693	2/1968	Weltman, Jr.	277/211 X
3,731,324	5/1973	Moon	4/18
3,732,577	5/1973	Moon	4/18
3,750,411	8/1973	Shimizu	277/207 X

Primary Examiner—Henry K. Artis

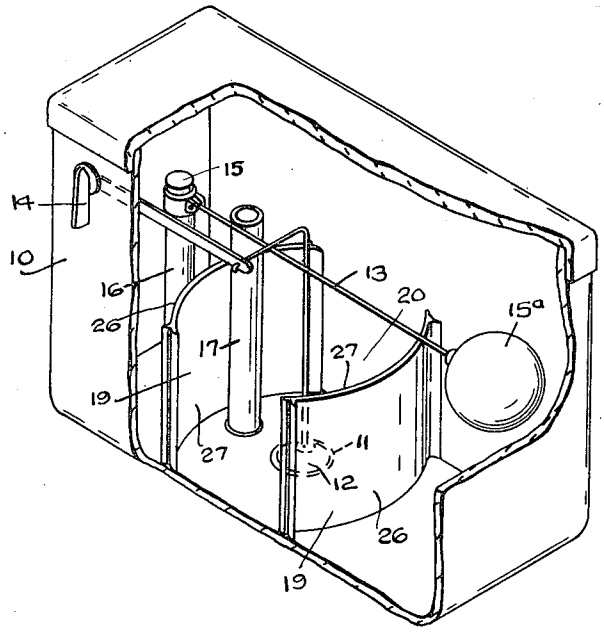
Attorney, Agent, or Firm—Edelson and Udell

[57] **ABSTRACT**

A water-saving system designed for installation in an existing water closet tank of a conventional toilet which employs a pair of weir-like baffle members disposed to either side of the flush valve of the tank to provide therein a water-tight well through which only the water contained in the well together with the water in the tank above the top level of the well is discharged into the toilet upon each flushing operation thereof. The tank water surrounding the well below the top level thereof, which is retained in the tank, constitutes the water saved, which saved water, after each flushing operation, is then supplemented with a fresh supply of only so much water above the top level of the well as is required for producing the hydrostatic head necessary for each flushing operation of the toilet.

The baffle members which dam up a substantial volume of the water contained in the bottom portion of water tank are each provided with flexible gasket flanges extending along the bottom and opposite side edges thereof which serve to provide not only water-tight sealing engagement with the tank but also good frictional engagement therewith for securely holding the members in fixed positions.

11 Claims, 11 Drawing Figures



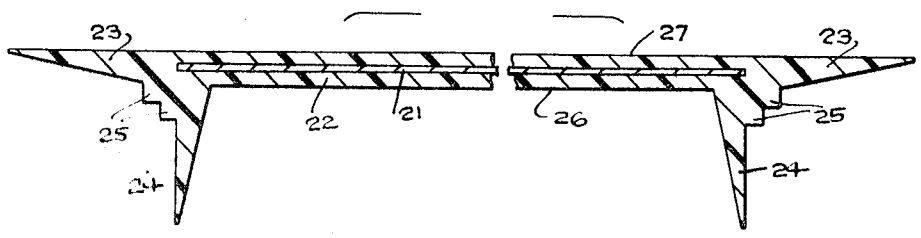


FIG. 1

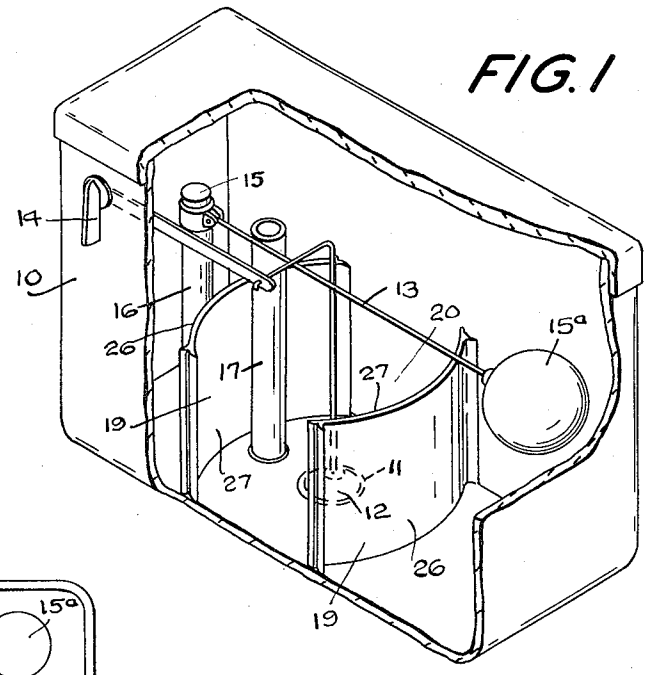


FIG. 2

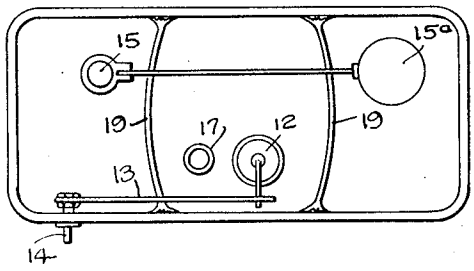


FIG. 3

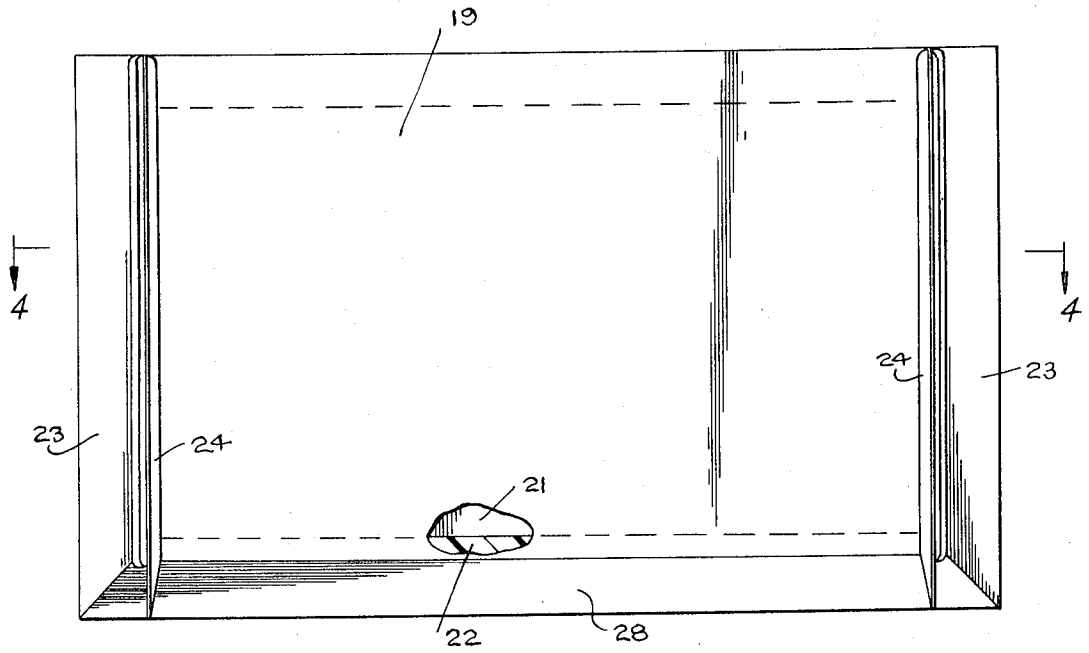


FIG. 4

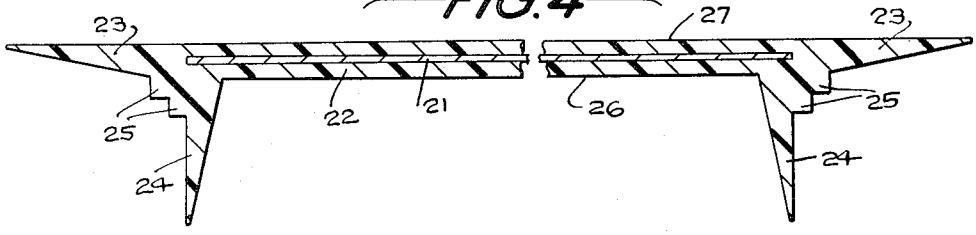
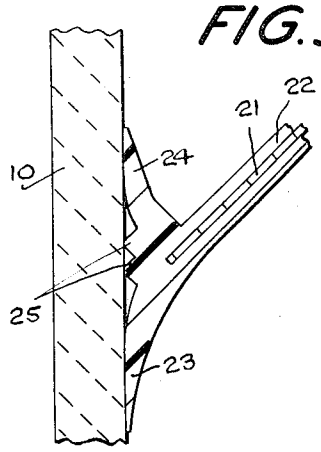
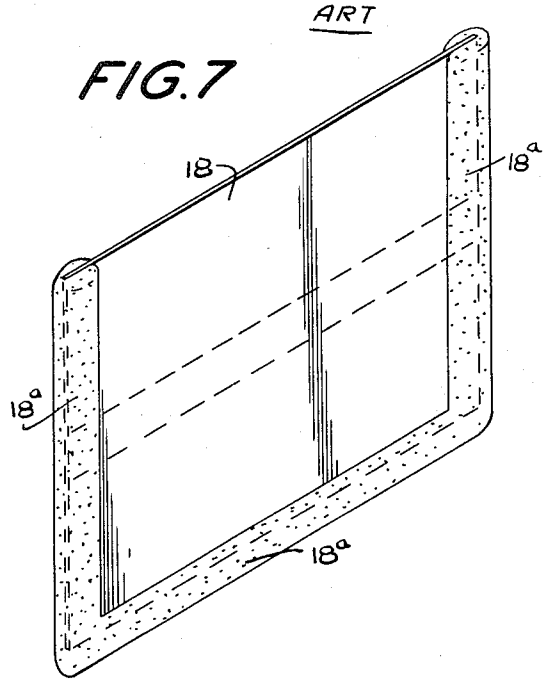


FIG. 5



PRIOR ART

FIG. 7



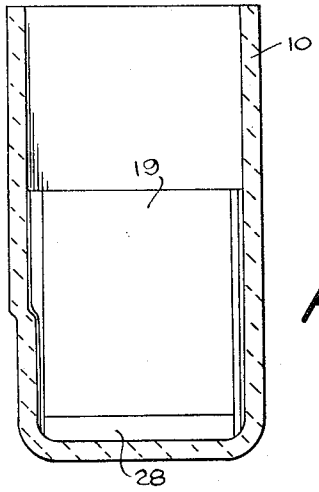


FIG. 6

FIG. 8

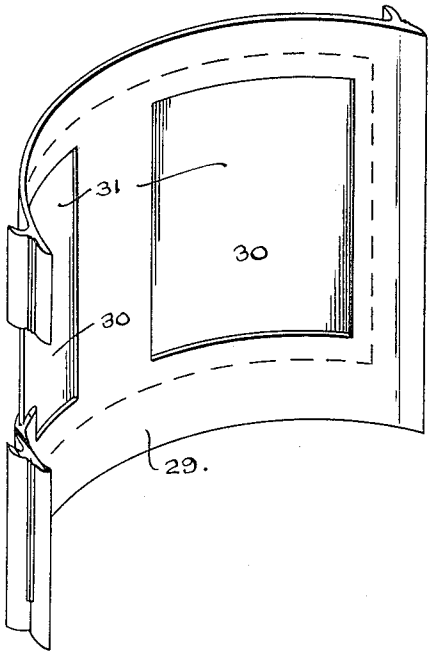
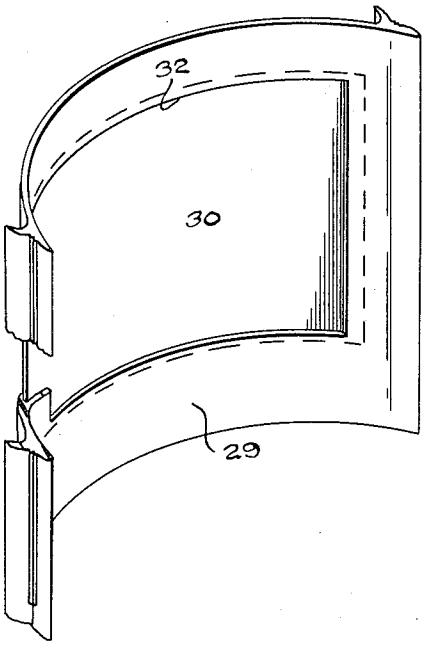


FIG. 9



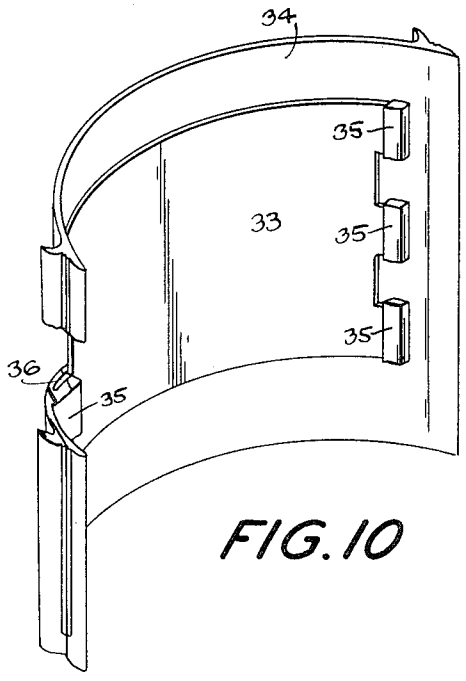


FIG. 10

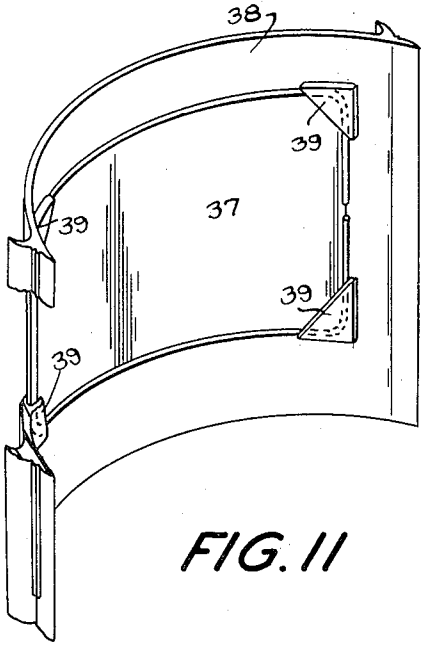


FIG. 11

FLUSH TANK WATER SAVER

This invention relates generally to water closets and more particularly to a means which may be installed in a conventional flush tank for saving a substantial amount of the water which is used in the flushing of the water closet.

Among the principal objects of the present invention is the provision of a simple and inexpensive means which is adapted to be removably installed in the water tank of an existing flush toilet which operates to dam up and prevent overflow from the tank of a portion of the contained water, and permit the outflow of only so much of the water contained therein as is required to provide the requisite hydrostatic head of water for proper flushing of the toilet, whereby, after each such flushing operation, only a limited amount of fresh water need be supplied to the tank to re-establish the required hydrostatic head of water.

More specifically, it is an object of the present invention to provide a pair of weir or baffle members which are adapted to embrace the flushing valve of the tank and form conjointly with the bottom, front and back walls of the tank an open-topped water-tight well which, when emptied, prevents discharge from the tank of all of the water contained therein in surrounding relation to the well itself.

A further object of the invention is to provide a water-damming system which is readily installable in an existing water tank of a conventional toilet and which includes a pair of baffle members which respectively serve to dam against discharge from and for retention in the tank during each flushing action of the toilet substantial volumes of water which would otherwise be wasted.

Still another object is to provide a water damming system in a conventional water closet tank in which weir-like baffle members, which extend cross-wise of the tank between the front and back walls thereof, are provided with means for insuring water-tight seals between said members and the tank wall surfaces engaged thereby and which insure that said members are held securely in adjustably fixed positions relatively to one another whereby to form a water-tight wall in the bottom portion of the tank of whatever volumetric capacity is required for maintenance of the hydrostatic head needed for adequate flushing of the toilet.

Other objects and advantages of the present invention will be apparent hereinafter, it being understood that the invention consists substantially in the combination, construction, location and relative arrangement of parts as described in the following specification, as shown in the drawings and as finally pointed out in the appended claims.

In the accompanying drawings:

FIG. 1 is a cut-away perspective view of a toilet tank showing installed therein the water-saving weir or baffle arrangement of the present invention.

FIG. 2 is a top plan view of the installation illustrated in FIG. 1;

FIG. 3 is an elevational view of the outer face of one of the water-saving weirs constructed in accordance with the principles of the present invention;

FIG. 4 is a longitudinal cross-sectional view of the weir as taken along the line 4—4 of FIG 3;

FIG. 5 is an enlarged sectional view of one end of one of the weirs showing its flexed positionment in sealing engagement with one wall of the toilet tank;

FIG. 6 is a transverse vertical cross-sectional view of the water tank showing the outer face of one of the weirs in its flexed position extending between the front and rear walls of the toilet tank;

FIG. 7 is a perspective view of a prior art construction of a weir or baffle designed for use in toilet tanks to form a dam in the bottom of the toilet tank; and

FIGS. 8 to 11 are perspective views which respectively show various modified forms of the dam-forming weir or baffle constructed in accordance with and embodying the principles of the present invention.

In the several figures, like elements are denoted by like reference characters.

The conventional flush toilet includes, as shown in FIG. 1, a water closet tank **10** which communicates with a toilet bowl (not shown) through a discharge opening **11** provided in the bottom of the tank, which opening **11** is normally fitted with a vertically movable flush valve **12** to shut off communication between the water tank and the toilet bowl. This flush valve **12** is conventionally activated by a lever system **13** which includes an operating handle **14.**

Normally, the level of the water in the tank **10** is held to a predetermined level by a float valve **15** under control of a float **15***a*, fresh water being supplied to the tank by a water supply pipe **16** after each flushing of the water tank. Also, included in the conventional water closet tank is an upright open-topped overflow pipe **17.** In the conventional flush toilets, after a flushing operation has been completed, the water supply in the tank is substantially depleted whereupon the flush valve is closed to permit fresh water to be supplied to the tank under control of the float-operated valve, which supply of fresh water is of a volume requisite to provide the hydrostatic head for proper flushing action. However, the siphon action in the toilet bowl for each flushing operation starts considerably prior to empty of the water tank, usually before it is half emptied and since the water flowing from the tank after commencement of the siphon action is not necessary for the flushing action, most of the water flowing from the tank after the siphon action has started simply consitutes a waste of water.

In order to save this waste of water, it has been proposed prior to the present invention to install in the water tank in surrounding relation to the water discharge opening **11** a baffle or weir system designed to hold against discharge from the tank the above mentioned normally wasted volume of water, which proposed system involved the use of a pair of weir or baffle members one of which is shown in FIG. **7.** Each of these members consisted of a panel **18** of relatively rigid material having its bottom and opposite side edges gasketed, as at **18**a, with foamed plastic or other such compressible material to frictionally secure the relatively stiff panel **18** cross-wise between the front and rear walls of the water tank and at the same time provide a water-tight seal between the side and bottom edges of the panel and surfaces of the tanks respectively engaged by the panel. Two such panel members were used, one on each side of the tank discharge opening, to provide in effect a well of a depth substantially less than the float-regulated depth of the water in the tank.

It has been found, however, that these prior panels with their plastic foam edge extrusions were unsatifactory not only because they were relatively expensive to manufacture but also and more importantly because their plastic foam edges did not provide water-tight seals with the wall and bottom surfaces of the tank in which they were inserted. Since the foam absorbed water, the water in the tank in which the panels were submerged migrated to the tank surfaces engaged by the panels and so set up a slipping action which resulted in loss of frictional, water-tight retention of the panels in proper position for performance of their intended function.

The weir or baffle members of the present invention obviate the defects and disadvantages of the prior constructions above described in that they not only insure positive self-retention thereof in their installed positions in the water tank but also effectively provide a water-tight seal with the engaged surfaces of the water tank in which they are fitted.

Referring now to FIG. 1 it will be observed that the water tank **10** is shown as having installed therein a pair of weir or baffle members respectively designated **19—19** which conjointly form with opposed portions of the front and back walls of the tank in the region thereof which contains the bottom-discharge opening **11** as well designated **20,** which well **20** is of a vertical height terminating substantially below the float-controlled level of the water normally contained in the tank **10.**

Each of the well-forming weirs or baffles **19—19** as best shown in FIGS. **3** to **5,** consists of a flexible spring metal panel **21** of rectangular shape about which is molded or otherwise suitably applied a sheath **22** of any suitable rubber-like plastic material, such as that commercially available under the trademark "Crayton" manufactured by Shell Chemical Company. The plastic sheath **22,** which may be bonded or otherwise applied to one or both surfaces of the metal panel **21,** extends freely beyond the perimetral edges of the metal panel to provide the same with marginal portions consisting solely of the plastic material.

As best appears in FIG. **4,** the opposite edge portions of the plastic sheath for the metal plate **21** are each molded to a shape having angularly related freely extending flanges **23** and **24,** the flanges **23—23** at opposite ends of each member **19** being substantially coplanar with the main body portion thereof while the flanges **24—24** respectively associated with the flanges **23—23** extend substantially at right angles to the plane of the main body member. Each of the angularly related flanges **23–24** at each opposite edge of the member **19** is outwardly beveled to a feathered edge and each set of flanges is provided in the region of their juncture with vertically extending ridges **25** which are adapted to engate the tank wall when each pair of the flanges **23–24** are spread into their coplanar relation and so serve as squeegee elements in the region intermediate the spread apart flanges to insure an effective water-tight seal throughout the area encompassed by the expanded flanges.

At this point it whould be noted that the flanges **24—24** of each of the members **19—19** extend outwardly from what should be considered the outer face **26** of each such member as distinguished from the inner face designated **27.**

The members **19—19** are each sufficiently flexible lengthwise thereof as to permit the same to be bowed as shown in FIGS. **1, 2** and **5,** the bowing being such that the outer face **26** constitutes the convex surface and the inner face **27** the concave surface of each said member. The overall length of each member **19** measured lengthwise from side edge to side edge of its embedded metal plate **21** is substantially greater than the inside cross-wise dimension of the water tank into which the members **19—19** are inserted so that for said insertion the members **19—19** are necessarily bowed to thereby effect secure frictional engagement of the opposite ends of each member **19** respectively with the opposed inner surfaces of the front and back walls of the water tank.

As most clearly appears in FIGS. **1** and **5,** retention of the weir or baffle members in fixed position within the tank is further insured by the broad surface engagement with the tank which is provided by the spread-apart flanges **23–24** at each opposite end of the weir member. In addition to these flanges when spread into substantially co-planar relation as shown provides an effective water-tight seal of substantial area between the engaging surfaces of the weir members **19—19** and the walls of the water tank.

The longitudinally extending bottom edge portion **28** of the plastic covering material **22,** which portion extends freely beyond the bottom edge of the embedded metal panel **21,** is also tapered to a feathered edge to permit its ready conformation to any irregularities in the surface of the bottom of the water tank, it being understood, of course, that upon insertion of the weir members **19—19** into the tank the flexible bottom edge portions **28** thereof are pressed downwardly into water-tight engagement with the bottom wall of the tank.

With the weir members **19—19** installed as above described and as best shown in FIGS. **1** and **6,** it will be observed that they conjointly form within the tank the well designated **20,** the horizontal area of which may be varied as desired simply by adjusting the spacing between the inserted weir members. Thus, any predetermined volume of water may be retained within the well with no peripheral leakage. When the water tank is replenished with fresh water after each flushing of the toilet to a level regulated by the float-controlled valve, which level is higher than the vertical depth of the well **20,** the latter is of course filled with water. Upon opening of the flushing valve **12** upon each flushing operation of the toilet, the head of water above the top level of the well **20** together with the water contained in the well itself, is discharged from the tank by the way of its discharge opening **11,** leaving intact in the tank the volume of water which surrounds the well **20** formed by the weir or baffle members **19—19.** The water which so remains in the tank, which normally would have been discharged in conventionally operated toilets, is that which is saved upon each flushing operation of toilets fitted with the well-forming weirs or baffles of the present invention.

It will be observed, as shown in FIG. **6,** that the angularly related side flanges **23–24** of the baffle members **19—19** are sufficiently flexible to permit them to readily conform to irregularities in the surfaces of the tank walls which they engage, such as the wall offset shown, and so prevent leakage of water from the well.

FIGS. **8** to **11** respectively show various modified constructions of the well-forming weir or baffle mem-

bers, all of which are shown in their flexed or bowed condition with their angularly related side flanges spread into substantially coplanar relation. It will be understood, of course, that in their normal unflexed condition, the weir members shown in FIGS. 8 to 11 are of substantially flat shape with their side flanges right angularly disposed as in the previously described form shown in FIGS. 3 and 4.

In FIGS. 8 and 9 the plastic material is shown as being molded or otherwise formed as an envelop or sleeve 29 into which a stiffening metal plate or panel 30 may be inserted. In FIG. emptying 8 the envelop is provided with a pair of windows 31—31 while in FIG. 9 it is provided with a single window 32 for insertion of the panel 30.

In FIGS. 10 and 11, the stiffening metal plate or panel 33 is shown as captively held to one face (preferably that forming the inner or concave face thereof when the baffle is bowed as shown) of a separately molded member of suitable plastic material having the same angularly related flanges previously described extending along each of its opposite side edges.

In FIG. 10, the plastic member 34 is provided upon its inner face with a plurality of lugs 35 disposed in vertically spaced relation adjacent each side edge of the member 34, the lugs being each provided with an interior slot 36 to receive therein an edge of the metal stiffening panel 33 to hold the same secured flatwise against the inner face of the molded plastic member 34.

In FIG. 11, the metal panel 37 is held against the inner face of a molded plastic member 38 having recessed corner gussets 39 integrally molded thereon for respectively receiving the corners of the plate.

It will be understood that the present invention is susceptible of various other changes and modifications which may be made from time to time without departing from the principles or real spirit thereof, and it is accordingly intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed as new and useful is:

1. For use in a toilet water closet tank which includes therein means for establishing and maintaining a predetermined hydrostatic head of water in the tank after each flushing operation of the toilet and a valve-controlled opening in the bottom of the tank for toilet flushing discharge of the water therefrom, a water-saving means comprising a pair of weir-like baffle members adjustably fixedly positionable in the water tank in embracing relation to said discharge opening to form in the tank an open-topped water-tight well extending upwardly from the bottom of the tank to a height substantially below the level of the water normally contained in the tank for maintenance of the hydrostatic head required for flushing operation of the toilet, each said member being of an overall length greater than the distance between the front and back walls of the tank and sufficiently flexible lengthwise to permit it to be sprung into bowed form between said walls with its opposite side edges respectively in engagement therewith, the opposite side edges of said members each having a pair of angularly related flanges of water-impervious flexible material extending along the full length thereof, said flanges being adapted to be expanded into substantially coplanar relation to provide for each edge of the member a relatively broad water-tight area of non-slipping contact with the surface of the tank wall engaged thereby.

2. A water-saving means as defined in claim 1 wherein the internal corner portion included between each pair of said angularly related flanges is provided with longitudinally extending ridges to provide a water-tight seal in the region intermediate the expanded flanges.

3. A water-saving means as defined in claim 2 wherein each of said angularly-related flanges is tapered to a feathered edge outwardly from said ridged internal corner of said flanges whereby to render the same readily conformable to variations in contour of the surfaces of the tank wall engaged thereby.

4. A water-saving means as defined in claim 1 wherein each of said well-forming members includes a relatively stiff but flexible panel and a sheath of a flexible rubber-like plastic material applied to at least one surface of said panel, said plastic sheath being extended freely beyond the perimetral edges of said panel, the freely extending side edge portions of said sheath being formed to provide said angularly related flexible flanges.

5. A water-saving means as defined in claim 4 wherein said panel and plastic sheath are disposed in laminated relation and are conjointly adapted to be flexed into a bowed form when each said member is sprung into fixed position between said front and back walls of the water tank.

6. A water-saving means as defined in claim 4 wherein the portions of the plastic sheath extending freely beyond the side and bottom edges of said panel are each tapered to a feathered edge which is conformable to the contour of the side and bottom wall surfaces of the tank to provide a water-tight seal between said surfaces and the side and bottom edges of said sheath.

7. A water-saving means as defined in claim 4 wherein the internal corner portion included between each pair of said angularly related flanges is provided with longitudinally extending ridges to provide a water-tight seal in the region intermediate the expanded flanges.

8. A water-saving means as defined in claim 4 wherein said plastic sheath is in the form of an envelop having a pocket within which said stiff but flexible panel is inserted.

9. A water-saving means as defined in claim 4 wherein said plastic sheath is provided upon one face thereof in opposite end portions thereof with means respectively engageable with corresponding end portions of said panel to secure the latter flatwise against said one face of the sheath.

10. A water-saving means as defined in claim 8 wherein said envelop is provided in one of its pocket-forming walls with at leat one open window through which said panel may be inserted into said pocket.

11. A water-saving means as defined in claim 9 wherein said panel-securing means consists of lugs formed as integral elements of said sheath having slots for receiving edge portions of said metal plate.

* * * * *